

Cruise Summary

- : must be included
- : may be included as necessary

1. Cruise Information

- Cruise ID: MR15-03
 - Name of vessel: R/V Mirai
 - Title of the cruise: Observational studies on the Arctic Ocean climate and ecosystem variability
 - Chief scientist [Affiliation]: Shigeto Nishino [JAMSTEC]
- Studies on board
- Representative of the Science Party [Affiliation]: Shigeto Nishino [JAMSTEC]
 - Title of proposal: Observational studies on the Arctic Ocean climate and ecosystem variability
 - Representative of the Science Party [Affiliation]: Nobuyoshi Yamashita [National Institute of Advanced Industrial Science and Technology]
 - Title of proposal: Estimation of hazardous chemicals discharge from the melting ice in the Arctic Ocean
 - Representative of the Science Party [Affiliation]: Koji Hamasaki [Atmosphere and Ocean Research Institute, The University of Tokyo]
 - Title of proposal: Studies on microbial production variability and dinitrogen fixation in the ecosystem of rapidly changing Arctic Ocean
 - Representative of the Science Party [Affiliation]: Masao Ishii [Meteorological Research Institute]
 - Title of proposal: Studies on the dynamics of greenhouse gases and volatile organic compounds in the Arctic Ocean
- Studies not on board
- Representative of the Science Party [Affiliation]: Kazuma Aoki [Toyoma University]
 - Title of proposal: Aerosol optical characteristics measured by Ship-borne Sky radiometer
 - Representative of the Science Party [Affiliation]: Yugo Kanaya [JAMSTEC]
 - Title of proposal: Advanced measurements of aerosols in the marine atmosphere: Toward elucidation of interactions with climate and ecosystem
 - Representative of the Science Party [Affiliation]: Masaki Katsumata [JAMSTEC]
 - Title of proposal: Global distribution of drop size distribution of precipitating particles over pure-oceanic background

- Representative of the Science Party [Affiliation]: Masao Nakanishi [Chiba University]

- Title of proposal: Tectonic history of the Pacific Plate during mid-Cretaceous

- Cruise period:

 - Leg 1: 24 August 2015 – 6 October 2015

 - Leg 2: 9 October 2015 – 22 October 2015

- Ports of departure / call / arrival:

 - 24 August 2015, Sekinehama (leave port)

 - 24 August 2015, Hachinohe (arrival in port)

 - 26 August 2015, Hachinohe (leave port)

 - 6 October 2015, Dutch Harbor (arrival in port)

 - 9 October 2015, Dutch Harbor (leave port)

 - 21 October 2015, Hachinohe (arrival in and leave port)

 - 22 October 2015, Sekinehama (arrival in port)

- Research area:

 - The North Pacific Ocean, the Bering Sea, and the Arctic Ocean

- Research map

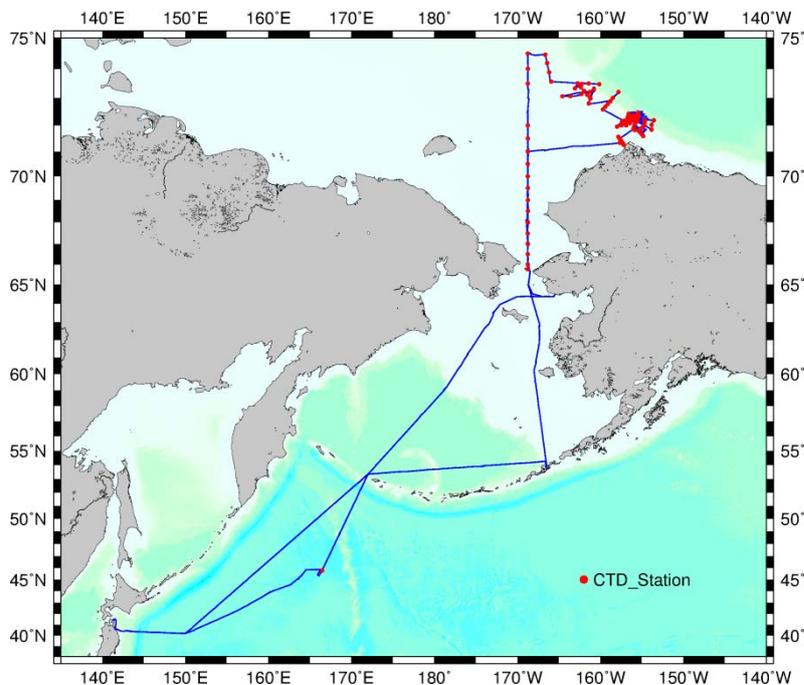


Figure 1. Research area and cruise track of MR15-03.

2. Overview of the Observation

In this cruise, to examine physical and chemical characteristics of an eddy that contains the Pacific-origin summer water in an area around the Barrow Canyon off the coast of Alaska, and to study the temporal variation of the eddy and its impact on the lower-trophic level ecosystem, we conducted ship-based observations of ADCP, TurboMAP (turbulent measurements), PRR (underwater spectral irradiance and radiance measurements), CTD/water samplings, XCTD, UCTD, GPS drifting buoys, and plankton nets. We also deployed a sediment trap in this area to investigate particle transports by the eddy. Furthermore, we recovered and re-deployed moorings to estimate transports of the Pacific-origin summer and winter waters and the associated heat and freshwater (salt) fluxes, and to study their seasonal variations.

On the other hand, in an area around the Hanna Canyon, a downstream area of the eddy passage, we conducted ship-based observations of TurboMAP (turbulent measurements), PRR (underwater spectral irradiance and radiance measurements), CTD/water samplings, and plankton nets to examine physical and chemical characteristics of the water there and distributions of phyto- and zooplanktons. Another sediment trap was deployed in this area to study the spatial variation of particles with the migration of the eddy. This area is also located in a passage of the Pacific-origin winter water. Thus, the sediment trap may capture the seasonal variation and an eddy formation of the winter water.

In the Chukchi Sea, we set an observation line along the 168° 45'W meridian near the U.S.–Russia border from the Bering Strait to the shelf slope. Along this line, we conducted ship-based observations of TurboMAP (turbulent measurements), PRR (underwater spectral irradiance and radiance measurements), CTD/water samplings, and plankton nets to examine physical and chemical characteristics of waters and wide-area distributions of phyto- and zooplanktons from a biological hotspot in the southern Chukchi Sea, where is one of the most biologically productive regions of the world's oceans, to a lower productive region in the northern end of the sea.

Along the cruise track, we performed observations of radiosonde, Doppler radar, general meteorology, air sampling, sky radiometer, MAX-DOAS (Multi-Axis—Differential Optical Absorption Spectroscopy), disdrometers, sea surface water monitoring, sea bottom topography, gravity, and magnetic fields. In addition, magnetic total force intensity was measured by towing an instrument, Cesium precession magnetometer, in the North Pacific Ocean.

Note that the field experiment in an area off the coast of Siberia, where the data are extremely scarce, was canceled due to a heavy sea ice condition.